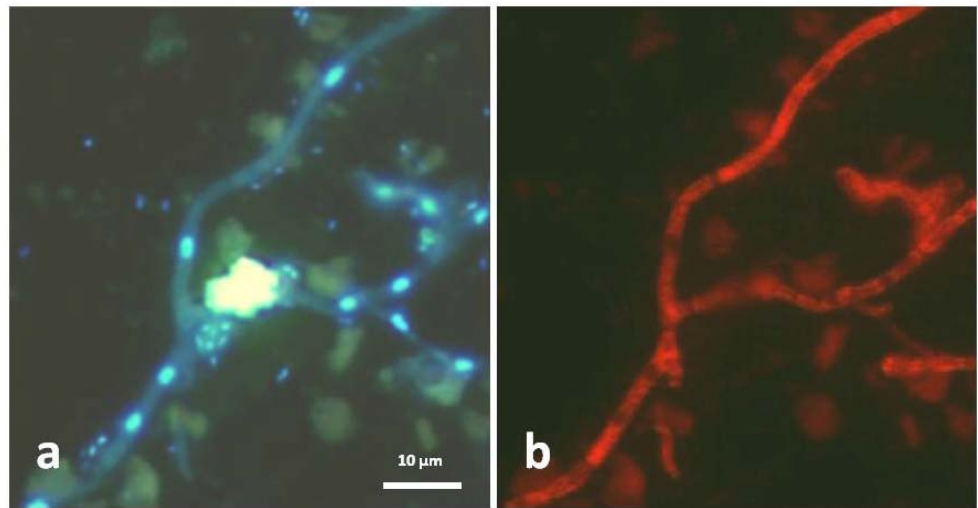


Microbe-earthworm interactions

Interactions between bacteria and invertebrates were topic of studies on the effect of passage of bacteria through the gut of the earthworm *Lumbricus terrestris*. The analysis focused on the use of the whole cell hybridization technique for the *in situ* analysis of different bacterial populations during gut passage and for studies on the effect of passage on dormant stages (i.e. endospores of *Bacillus megaterium* and cysts of protozoa). This topic included the development of a detection protocol for endospores by whole cell hybridization. In addition, automated image analysis tools were developed to reliably determine cell size distributions, biovolumes and biomass of fungi, protozoa, Archaea and Bacteria in captured epifluorescence micrographs after DAPI-staining or *in situ* hybridization. The studies revealed that larger cells (i.e. active, vegetative cells of fungi, bacteria, and protozoa generally originating from leaf litter ingested together with soil) were disrupted in the anterior part of the intestine of *L. terrestris* while small cells (i.e. dormant stages like spores of bacteria and fungi, or cysts of protozoa originating from soil) were activated. This activation resulted in large shifts in micro-bial community structure and activities between the original soil and casts, and enhanced predator-prey interactions between protozoa and bacteria.



Filamentous fungi in decaying leaf litter detected by epifluorescence microscopy after DAPI-staining (a) and *in situ* hybridization (b)

Selected publications

1. Schönholzer, F., Hahn, D., Zarda, B., Zeyer, J. 2002. Automated image analysis and *in situ* hybridization as tools to study bacterial populations in food resources, gut and cast of *Lumbricus terrestris* L. Journal of Microbiological Methods 48, 53-68.
2. Cai, H., Zarda, B., Mattison, G., Schönholzer, F., Hahn, D. 2002. Fate of protozoa transiting the digestive tract of the earthworm *Lumbricus terrestris* L. Pedobiologia 46, 161-175.
3. Schönholzer, F., Hahn, D., Zeyer, J. 1999. Origin and fate of fungi and bacteria in the gut of *L. terrestris* L. studied by image analysis. FEMS Microbiology Ecology 28, 235-248.

4. **Kohli, L., Daniel, O., Schönholzer, F., Hahn, D., Zeyer, J.** 1999. *Miscanthus sinensis* and wild flowers as food resource of *Lumbricus terrestris* L. *Applied Soil Ecology* 11, 189-197.
5. **Schönholzer, F., Kohli, L., Hahn, D., Daniel, O., Goetz, Chr., Zeyer, J.** 1998. Effect of decomposition of leaves on bacterial biomass and on palatability for *Lumbricus terrestris* L. *Soil Biology & Biochemistry* 30, 1805-1813.
6. **Fischer, K., Hahn, D., Hönerlage, W., Zeyer, J.** 1997. Effect of passage through the gut of the earthworm *Lumbricus terrestris* L. on populations of *Bacillus megaterium*. *Soil Biology & Biochemistry* 29, 1149-1152.
7. **Fischer, K., Hahn, D., Hönerlage, W., Schönholzer, F., Zeyer, J.** 1995. *In situ* detection of spores and vegetative cells of *Bacillus megaterium* in soil by whole cell hybridization. *Systematic and Applied Microbiology* 18, 265-273.
8. **Fischer, K., Hahn, D., Amann, R.I., Daniel, O., Zeyer, J.** 1995. *In situ* analysis of the bacterial community in the gut of the earthworm *Lumbricus terrestris* L. by whole cell hybridization. *Canadian Journal Microbiology* 41, 666-673.